1111-209 A Novel Method to Assess Ventricular Contraction Dyssynchrony by Tissue Synchrony Index

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Background: Biventricular pacing (CRT) has been shown to improve symptoms and exercise capacity in patients with heart failure and a wide QRS complex. Criteria for patient selection and lead positioning are essential for achieving clinical benefit.
Methods and Results: Twenty-eight patients (20 males, 66±11 years) with ischemic and nonischemic cardiomyopathy and NYHA class III to IV heart failure and QRS duration >140 ms receiving CRT were assessed before and after pacing. Tissue Doppler echocardiography was performed using a 4-basal, 4-mid segmental model (4-and 2-chamber) to assess the time to peak systolic velocity (TS), and the time to peak myocardial displacement (TPMD).
The septal posterior wall delay (SPWD) was measured by M-mode at the base in the parasternal long axis view. Tissue synchrony index (TSI) was used to show the ventricular segmental contraction delay. Patients with LBBB exhibited 3 different patterns of delay by TSI including delay involving the apical septal (n=5), the basal and mid inferior (n=4) and the basal lateral wall (n=16). Patients with RBBB demonstrated delay involving the septum (n=3). The standard deviation of time to TS and TPMD between segments was used as an index of synchronization. There was significant improvement of TSI after pacing.

	TS(msec)	TPMD (msec)	SPWD (msec)
Sinus	44±16	74±25	141±103
Pacing	35±16	47±29	48±50
p	0.03	0.0007	0.001

Conclusions: TSI is a new index, which provides rapid visualization ofventricular contraction dyssynchrony, providing a potentially useful method for selection of patients and for implant pacing lead localization.

1111-210 The Predictive Value of QRS Duration as a Marker of Ventricular Dyssynchrony

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Background: Cardiac resynchronisation therapy (CRT) is becoming widely used in the management of advanced cardiac failure due to systolic dysfunction and ventricular dyssynchrony. QRS prolongation is used as a surrogate marker of dyssynchrony, but not all patients with QRS prolongation benefit from CRT. A reason may be that QRS prolongation and ventricular dyssynchrony are not closely related.
Aim: To correlate QRS prolongation with an echocardiographic indicator of ventricular dyssynchrony –aortic pre-ejection delay (APED).
Methods : 153 patients with symptomatic heart failure and left ventricular systolic dysfunction were retrospectively analysed. Adequate data was collected from 118 patients. QRS duration was measured automatically (MAC 1200 - Marquette). APED, measured as time from the onset of QRS to the onset of aortic forward flow using pulsed wave Doppler above the level of the aortic valve (Echopac 6.2 GE Vingmed), the mean value from 3 beats being recorded. Poor quality ECG recording with the doppler signal accounted for the majority of inadequate data, and excluded patients.
Results: Baseline characteristics: Age 73.1(SD 7.3), NYHA class II(73), III(37), IV (8), mean ejection fraction 29.4% (SD 9.5),35% of all subjects had a QRS duration > 120ms. The correlation between the QRS duration and the APED was only moderate (Pearson correlation 0.47,p=0.001). The correlation was higher in patients with QRS>120 (R=0.67,p=0.001) and lower in patients with a QRS <=120ms (R=0.08, p=n/s)
Conclusion: QRS duration and APED have only a modest association. The correlation is stronger in those with significant QRS prolongation. There is a poor correlation below a QRS duration of 120ms. This suggests that using QRS prolongation as a sole indicator of dyssynchrony may exclude a number of heart failure patients with a demonstrable marker of echocardiographic dyssynchrony. The data does not however indicate if such patients would respond to CRT

1111-211 Narrowing of the Widest QRS Predicts Improvement in Functional Class and Echocardiographic Parameters in Patients With Cardiac Resynchronization Therapy Devices

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Few parameters have been shown to predict improvement in patients treated for congestive heart failure (CHF) with cardiac resynchronization therapy (CRT). To assess whether narrowing of the QRS duration after CRT device implantation predicts improvement in clinical and echocardiographic parameters we collected these data for 145 consecutive patients treated with CRT at the Cleveland Clinic Foundation between 09/01/1998 and 02/01/2002 (age 66±13 years, 68% male, 63% ischemic cardiomyopathy). All patients had pre and post implantation 12-lead ECG and 2D-echocardiograms. Widest QRS in any lead before and after CRT was documented. Functional status was assessed during follow-up at the CHF clinic. QRS narrowed significantly with CRT from 187.2+/- 30.7 msec to 179.4 +/- 24.8 msec (p< 0.007). In patients who experienced QRS narrowing with CRT, NYHA functional class, left ventricular end diastolic dimension (LVEDD), and mitral regurgitation (MR) improved significantly versus patients in whom the widest QRS did not narrow. There was a strong trend towards improvement in the left ventricular end systolic dimension (LVESD) and ejection fraction (EF) in those with narrowed QRS. **Conclusion**: Narrowing of the widest QRS complex after CRT device implantation predicts improvement in NYHA functional class, left ventricular end diastolic dimension and mitral regurgitation.

Parameter	Patients with narrowed QRS	Patients without narrowed QRS	P value
NYHA improvement, %	51%	33%	0.04
LVEDD decreased, %	78%	55%	0.004
LVESD decreased, %	72%	56%	0.06
MR Decreased, %	60%	42%	0.04
EF Improved, %	28%	16%	0.11

1111-212 Left Ventricular Asynchrony Predicts Heart Failure Progression After Cardiac Resynchronization Therapy

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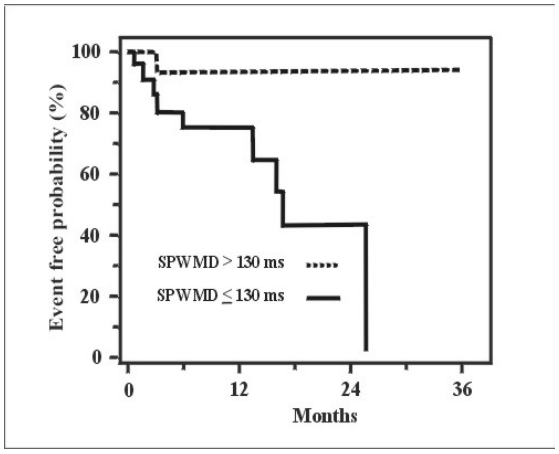
Echocardiographic evaluation of left ventricular asynchrony (LVA) has been shown to predict hemodynamic improvement after cardiac resynchronization therapy (CRT).
To test the role of LVA in predicting heart failure (HF) progression after CRT, we studied 44 patients (63±11 years, 23 male) with HF (9 with ischemic cardiomyopathy), NYHA class III, left bundle branch block (LBBB), in optimal medical therapy who underwent CRT. Before pacemaker implantation, LVA was evaluated by calculating QRS duration (168±18 ms) at ECG and septal to posterior wall motion delay, SPWMD (157±96 ms), at echocardiography; left ventricular end-diastolic diameter (LVEDD, 67±6 mm), left ventricular ejection fraction (LVEF, 25±6%) and mitral regurgitation (MR, 2.6±0.9 a.u.) were also evaluated.
During follow-up (13±9 months) 9 patients experienced HF progression (1 needed a stable increase of diuretic therapy, 6 were hospitalized and 3 died after worsening of HF). Among studied variables only SPWMD (p=0.02) and ischemic cardiomyopathy (p=0.02) were significantly related to events at univariate analysis. The Figure shows the Kaplan-Meier curves of patients with SPWMD above and below the median value.
In conclusion, in patients with severe HF and LBBB, the absence of a marked LVA at echocardiography is associated to the occurrence of HF progression after CRT, thus strengthening its role in predicting patients who will benefit from biventricular pacing.



1111-223 Left Ventricular Reverse Remodeling Predicted Rehospitalization for Heart Failure After Cardiac Resynchronization Therapy

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Background: Cardiac resynchronization therapy (CRT) has been shown recently to improve heart failure (HF) rehospitalization. It is also benefit the heart by inducing left ventricular (LV) reverse remodeling. This study investigated if responders of reverse remodeling were able to predict a lower rehospitalization event rate.
Methods: 53 patients (aged 65±11years, 66% male, 58% non-ischemic etiology) received CRT were prospectively studied. Echocardiography and clinical assessment were performed at baseline and 3-month follow up to assess LV reverse remodeling response. Responders were define as a reduction of LV end-systolic volume >15%.
Results: The mean duration of follow up was 753±386 days. Responders of reverse remodeling were observed in 57% of patients, whereas the rest were classified as non-responders (43%). Mortality occurred in 17% of patients, while HF developed in 13% of patients. The responders had a significantly lower rate of developing HF than non-responders (3% Vs 12%, Log Rank Chi^2=4.16, p<0.05). There was also a trend towards lower mortality rate for responders than non-responders, though it was not significant (13% Vs 22%). The responders also had a greater improvement of New York Heart Association class (-1.04±0.5 Vs -0.5±0.6, p=0.01) and peak exercise capacity (1.1±1.6 Vs -